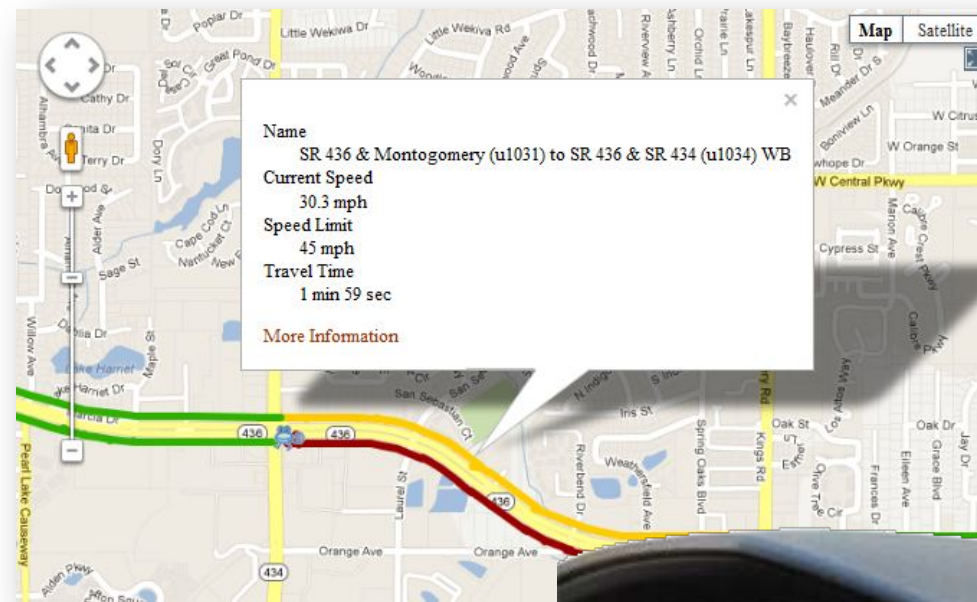




BlueTOAD™

# BlueTOAD®

## Bluetooth® Travel-Time Monitoring



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# Discussion Points

BlueTOAD™

- What is Bluetooth and a MAC address
- What is BlueTOAD
- How does BlueTOAD use Bluetooth to generate Travel-Times & Speeds
- BlueTOAD Configurations
- BlueTOAD Applications – over 1000 units deployed
- BlueTOAD Website:
  - Data Outliers
  - Extracting MAC addresses
  - Real-time application
- BlueTOAD in 3<sup>rd</sup>-party applications



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# Intro to Bluetooth and MAC address...

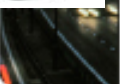


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- **Bluetooth** is an open wireless technology standard for exchanging data over short distances from fixed and mobile devices, creating personal area networks (PANs) with high levels of security.
- Bluetooth uses a radio technology called frequency-hopping spread spectrum and is in the 2.4 GHz short-range radio frequency band
- A **Media Access Control address (MAC address)** is a unique identifier assigned to network interfaces for communications on the physical network segment



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# How does BlueTOAD work with Bluetooth..



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WWW.TRAFFICCAST.COM



Servers



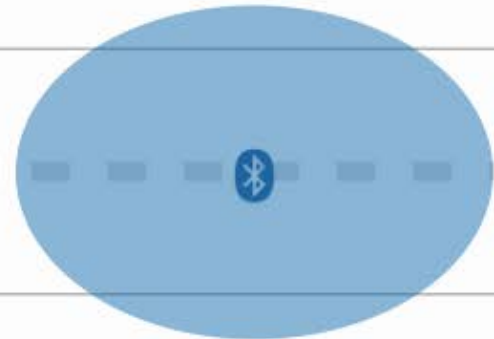
Timer

00:30 min/sec

BlueTOAD - A



BlueTOAD - B



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# BlueTOAD Bluetooth Travel-time Origination And Destination

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TrafficCast has leveraged the mobile phone industry's use of open hardware and software platforms to create BlueTOAD for travel-times and speeds.

## Key Features:

- Completely non-intrusive, MAC address pairing
- Limited or no configuration (~30 min. install)
- Stand alone or in existing cabinet
- Local and Wireless Operation (Ethernet)
- For use in Arterials and Freeways
- Real-time network and device monitoring
- Over-the-Air software downloading
- Web Services Interface (24x7 monitoring)
- Future expansion design



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# BlueTOAD Configuration Options



Solar/Cellular BlueTOAD



Ethernet BlueTOAD



Mini-BlueTOAD

## For all Configurations...

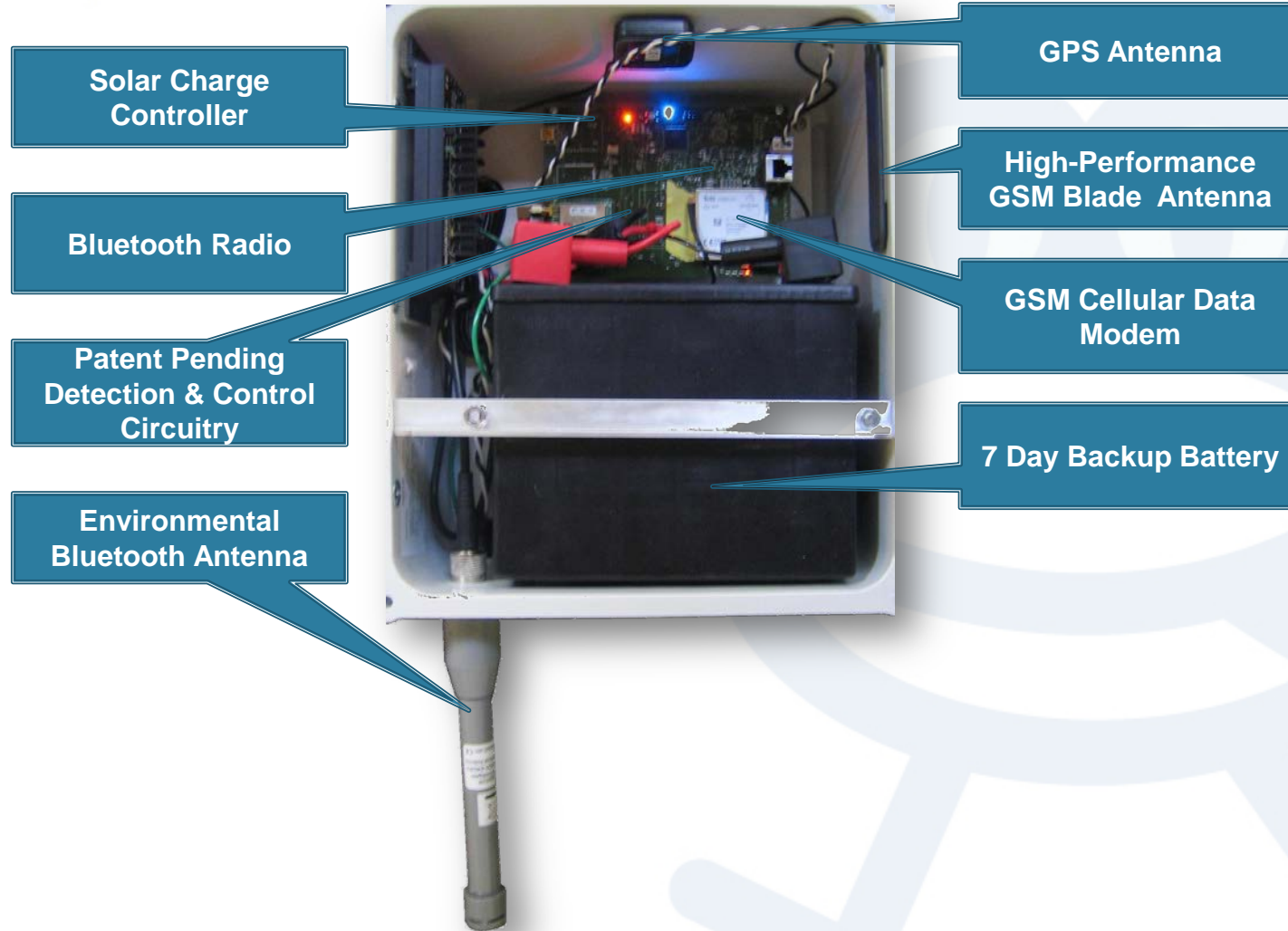
- Permanent or Temporary deployments
- Ethernet and/or Cellular communications
- AC or DC Solar Power
- Real-Time or Post Processed data collection
- Web-enabled and Archived data management





# Solar/Cellular BlueTOAD

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# Ethernet BlueTOAD

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## Ethernet BlueTOAD

- Power Over Ethernet (POE) for simple installation
- IP addressable – static or DHCP
- Outbound network traffic only
- Ethernet 10Base-T/100Base-T
- Cellular Option



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# Mini-BlueTOAD for Post-Processed Data

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## Mini-BlueTOAD

- 14-day battery
- 6" x 6" x 4" form factor
- AC or DC Solar Power
- 2 GB SD-Card Storage
- Simple upload  
(Post-Processed data)
- Optional Solar Panel



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# BlueTOAD

Bluetooth Travel-Time Origination And Destination



# BlueTOAD

## Third-Party Applications

Integration with Real-Time Systems  
using BlueTOAD Data





# Third-Party Integration

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- XML data used in Advanced Transportation Management Systems (ATMS)
  - Econolite Centrac's ATMS
  - Transcore ATMS
  - 360 Surveillance
  - Delcan ATMS
  - Arcadis T2 Analytics
  - Telvent
  - ASTI



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# BlueTOAD Recap

Integration with Real-Time Systems  
using BlueTOAD Data



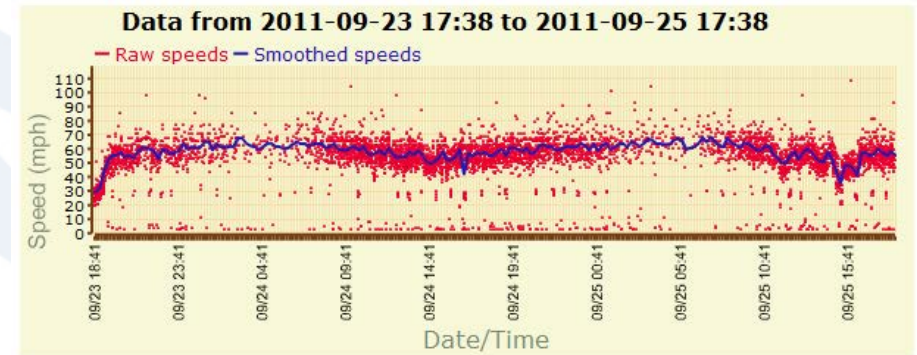
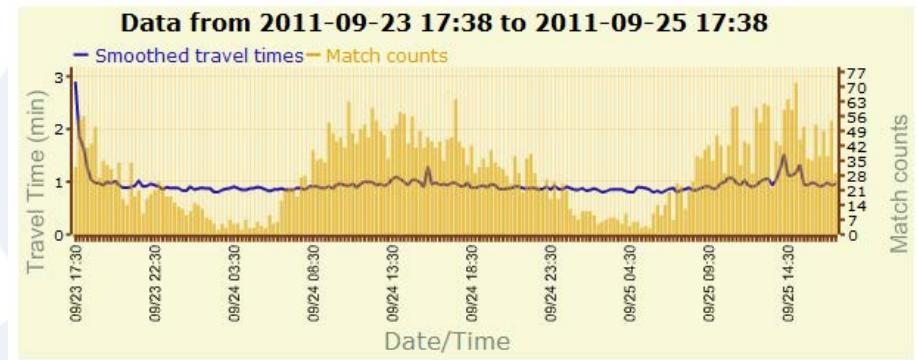


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# Effectively Filter Data Outliers

BlueTOAD IP (travel times and speeds):

- recognizes detection matches, which do not fit the flow of traffic represented by the majority of Bluetooth pairs.
- are factored by on-going real-time analysis of multiple matches,
- recognizes and reduces or eliminates, weighting of simultaneous matches.



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# Reporting Capabilities

Home >

## BT Reports

▼ Generate Report

Bluetoad Pair / Route: \*

107: (Nordic to Addison)

Start Date: \*

Feb 20 2011

Start Time (24-hours): \*

00 00

End Date: \*

Feb 24 2011

End Time (24-hours): \*

23 59

Report Type: \*

Smoothed Speeds: 15 min aggregate

Output Type: \*

CSV

Generate

Home >

## BT Reports

▼ Generate Report

Report Parameters

Pair / Route

107: (Nordic to Addison)

Start Date

2011-02-20 00:00:00

End Date

2011-02-24 23:59:00

Type

Smoothed Speeds: 15 min aggregate

Time Interval	Travel time (s)	Speed (mph)
2011-02-20 00:00	109.0	59.45
2011-02-20 00:15	107.3	60.39
2011-02-20 00:30	106.4	60.88
2011-02-20 00:45	107.1	60.49
2011-02-20 01:00	102.2	63.44
2011-02-20 01:15	103.8	62.41
2011-02-20 01:30	107.0	60.57
2011-02-20 01:45	112.0	57.87
2011-02-20 02:00	107.5	60.28
2011-02-20 02:15	108.0	60.00
2011-02-20 02:30	103.5	62.61
2011-02-20 02:45	104.0	62.33
2011-02-20 03:00	103.9	62.34
2011-02-20 03:15	104.9	61.76

- 5 and 15 minute reporting capability on all archived data
- Individual speeds available
- HTML, CSV and graphing outputs



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# Reporting Capabilities

**Blueoad Pair / Route: \***  
1604: (Rt 17 Bergen Co - Rt 17 & Terrace Ave (u192) to Rt 17 & Farview Ave (u193) - North) ▼

**Start Date: \***  
11/09/2011

November 2011

SU	MO	TU	WE	TH	FR	SA
			1	2	3	4
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

**Blueoad Pair / Route: \***  
1604: (Rt 17 Bergen Co - Rt 17 & Terrace Ave (u192) to Rt 17 & Farview Ave (u193) - North) ▼

**Start Date: \***  
11/16/2011  
Format: 11/21/2011

**End Date: \***  
11/18/2011  
Format: 11/21/2011

Add another pair or route to compare

**Report Type: \***  
Realtime Smoothed Speeds: 15 min aggregate ▼

**Start Time (24-hours): \***  
06:00

**End Time (24-hours): \***  
09:00

**Data Format: \***  
Travel Time (s) ▼

**Output Type: \***  
HTML ▼

Generate

**Report Parameters**

**Pair/Route Locations**

1. Rt 17 Bergen Co - Rt 17 & Terrace Ave (u192) to Rt 17 & Farview Ave (u193) - North: 2011-11-09 - 2011-11-11
2. Rt 17 Bergen Co - Rt 17 & Terrace Ave (u192) to Rt 17 & Farview Ave (u193) - North: 2011-11-16 - 2011-11-18

**Start Time**  
06:00:00

**End Time**  
09:00:00

**Type**  
Individual Speeds (Filtered): 15 min aggregate

**Comparison Report**

Travel Time (sec)

Date/Time

- Before and After reports on all pairs and routes
- TOD selectable (AM or PM Peak)
- HTML, CSV and graphing outputs








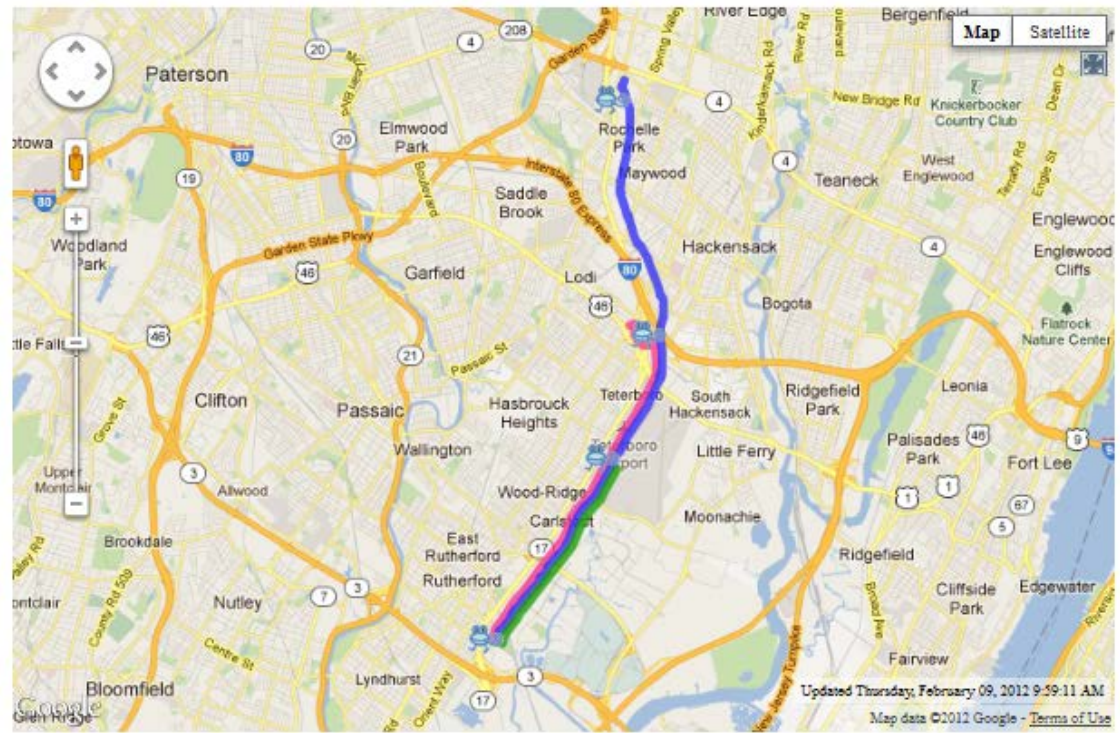


# Reporting Capabilities

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- Origin/Destination study
- % Matches of selected paths
- Pie Chart, Bar Chart, Map, HTML, CSV output options

Origin	Destination	Waypoint	Map/Graph Color	Number of matches	Percentage of matches	
Rt 17 & Rt 3 (u169)	Rt 17 & Parterson Ave (u171)			7244	45.36%	<a href="#">Edit path</a>
Rt 17 & Rt 3 (u169)	Rt 17 & Terrace Ave (u192)			4982	31.20%	<a href="#">Edit path</a>
Rt 17 & Rt 3 (u169)	Rt 17 & Farview Ave (u193)			3744	23.44%	<a href="#">Edit path</a>
<b>Total</b>				<b>15970</b>	<b>100%</b>	





# Multi-Jurisdictional Data Sharing

BlueTOAD™

**Start Date: \***  
   
Format: 11/11/2011    Format: 06:23

**End Date: \***  
   
Format: 11/11/2011    Format: 06:23

**Paths to compare:**

Origin	Destination	Waypoint	Path/Pair Distance	
i95 & Acosta Expy (u1186)	i95 & Atlantic Blvd (u1185)		0.9	<input type="button" value="Delete"/>
i95 & Acosta Expy (u1186)	i95 & University Blvd (u1183)		<input type="text" value="3.8"/>	<input type="button" value="Delete"/>
i95 & Acosta Expy (u1186)	i95 & Bowden Rd (u1182)		<input type="text" value="6.2"/>	<input type="button" value="Delete"/>

- Florida DOT (District 2)
  - Multi-jurisdictional data sharing (City, State, MPO)
  - City-wide (Jacksonville) network for signal timing improvements (arterials & freeway)
  - Modeling tool for MPO long term transportation plan
  - ITS Tool for FDOT



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# The Use and Need for Travel-Times and Data

- **Operations** – real-time accurate travel-times and speeds via a website and/or data push to your website. Arterials are a great application for BlueTOAD as it is a performance-based tool.
- **Work Zones & Evacuation Routes** – due to the flexible and simple installation being solar-powered and cellular uplink, it takes less than an hour to install a unit, BlueTOAD is being used for work zone projects
- **Traveler Information & 511** – Having a complete turn-key solution, we are able to push out travel-times and speeds via XML real-time to your website.
- **ITS** – with real-time information, you are better informed on what is going on with key arterials and/or freeways.
- **Planning** – all data is being archived and can be used for later retrieval. This is also a great addition to travel-demand models as it can validate the model and add arterial data to it. Before and after studies of re-timed signals is now 24x7 and automated.



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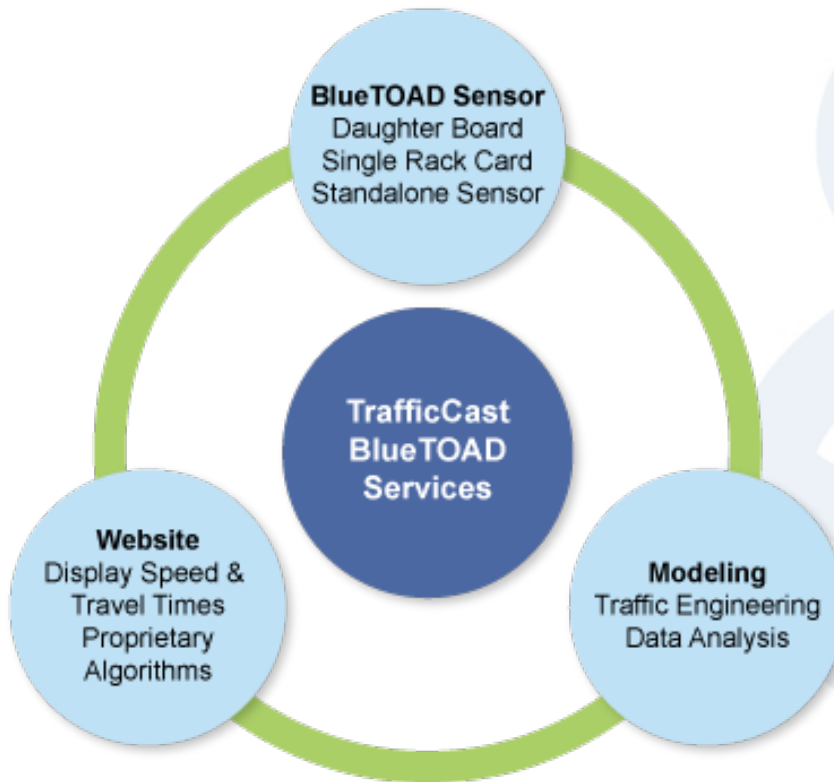


# BlueTOAD Turnkey Solution

BlueTOAD™

BlueTOAD is a highly integrated product offering by TrafficCast that includes:

- Web portal that allows customers to view the speed and travel times generated by the sensors
- Proprietary algorithms that smooth the data based upon road classes (i.e. arterial, expressways, etc.)
- Traffic engineering and data analysis that check to see if the data is accurate



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**Thank you!**

Stan Garren

